

DECLARATION

I, NOBUMITSU ASAH, a Japanese Patent Attorney registered No.10435, of Okabe International Patent Office at No. 602, Fuji Bldg., 2-3, Marunouchi 3-chome, Chiyoda-ku, Tokyo, Japan, hereby declare that I have a thorough knowledge of Japanese and English languages, and that the attached pages contain a correct translation into English of the priority documents of Japanese Patent Application No. 2001-010665 filed on January 18, 2001 in the name of CANON KABUSHIKI KAISHA.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made, are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed this  day of August, 2008


NOBUMITSU ASAH

PATENT OFFICE
JAPANESE GOVERNMENT

This is to certify that the annexed is a true copy of the following application
as filed with this Office.

Date of Application: January 18, 2001

Application Number: Japanese Patent Application
No. 2001-010665

[ST.10/C]: [JP2001-010665]

Applicant(s): CANON KABUSHIKI KAISHA

February 8, 2002

Commissioner,
Japan Patent Office KOZO OIKAWA (Seal)

Certificate No. 2002-3005049

2001-010665

Applicant's Information

Identification No. [000001007]

1. Date of Change: August 30, 1990

(Reason of Change) New Registration

Address: 3-30-2, Shimomaruko, Ohta-ku, Tokyo

Name: CANON KABUSHIKI KAISHA

2002-3005049

2001-010665

[Name of the document]	Patent Application
[Reference No.]	4118022
[Date]	January 18, 2001
[Addressed to]	Commissioner, Patent Office
[International Classification]	H04N 5/57 G06T 3/00 G09G 5/00
[Title of the Invention]	IMAGE DISPLAYING APPARATUS AND IMAGE DISPLAYING METHOD RESPECTIVELY HAVING IMAGE QUALITY ADJUSTMENT FUNCTION, AND RECORDING MEDIUM
[Number of the Claims]	19
[Inventor]	
[Domicile or Residence]	c/o Canon Kabushiki Kaisha 3-30-2, Shimomaruko, Ohta-ku, Tokyo
[Name]	MASAKI NAKANO
[Applicant]	
[Identification No.]	000001007
[Name]	CANON KABUSHIKI KAISHA
[Attorney]	
[Identification No.]	100077481
[Patent Attorney]	
[Name]	YOSHIKAZU TANI
[Elected Attorney]	
[Identification No.]	100088915
[Patent Attorney]	
[Name]	KAZUO ABE
[Indication of Official Fee]	
[Prepayment Ledger No.]	013424

[Amount] 21000

[List of Filed Materials]

[Material] Specification 1

[Material] Drawings 1

[Material] Abstract 1

[General Power of Attorney] 9703598

[Proof Requirement] Required

[Document Title] SPECIFICATION

2001-010665

[Title of the Invention]

IMAGE DISPLAYING APPARATUS AND IMAGE DISPLAYING
METHOD RESPECTIVELY HAVING IMAGE QUALITY ADJUSTMENT
5 FUNCTION, AND RECORDING MEDIUM

[Claims]

1. An image displaying apparatus comprising:
multiscreen synthesis means for composing one
10 screen by executing a trimming process to a part of
an input image and arranging plural pieces of that
image;
image quality adjustment value storage means for
storing plural combinations of image quality
15 adjustment values such as lightness, contrast,
chromaticity, hue, RGB (red, green and blue) balance,
color temperature, gamma characteristics, sharpness
(emphasis) and the like;
image quality adjustment process means for
20 executing the image quality adjustment processes for
plural images on the basis of the image quality
adjustment values of the respective combinations
stored in said image quality adjustment value storage
means; and
25 control means for converting an input image into
a first image to which an image quality adjustment
process was executed by said image quality adjustment

process means on the basis of an image quality adjustment value before performing an image quality adjustment operation stored in said image quality adjustment value storage means, and similarly

5 converting the input image into a second image to which an image quality adjustment process was executed by said image quality adjustment process means on the basis of an image quality adjustment value of newly performing an adjustment operation,

10 then displaying the converted first and second images on one screen with arranged state by said multiscreen synthesis means.

2. An image displaying apparatus comprising:
image enlargement and reduction means for

15 enlarging and reducing an input image;

multiscreen synthesis means for composing one screen by arranging plural pieces of the input image reduced by said image enlargement and reduction means;

20 image quality adjustment value storage means for storing plural combinations of image quality adjustment values such as lightness, contrast, chromaticity, hue, RGB balance, color temperature, gamma characteristics, sharpness (emphasis) and the

25 like;

image quality adjustment process means for executing the image quality adjustment processes for

plural images on the basis of the image quality adjustment values of the respective combinations stored in said image quality adjustment value storage means; and

5 control means for executing an image quality adjustment process to an input image by said image quality adjustment process means on the basis of an image quality adjustment value before performing an image quality adjustment operation stored in said
10 image quality adjustment value storage means and converting the input image into a first image which was reduced by said image enlargement and reduction means, and similarly executing an image quality adjustment process to the input image by said image
15 quality adjustment process means on the basis of an image quality adjustment value of newly performing an adjustment operation and converting the input image into a second image which was reduced by said image enlargement and reduction means, then displaying the
20 converted first and second images on one screen with arranged state by said multiscreen synthesis means.

3. An image displaying apparatus comprising:
image enlargement and reduction means for enlarging and reducing an input image;

25 multiscreen synthesis means for composing one screen by executing a trimming process to a part of the image reduced by said image enlargement and

reduction means and arranging plural pieces of that image;

image quality adjustment value storage means for storing plural combinations of image quality
5 adjustment values such as lightness, contrast, chromaticity, hue, RGB balance, color temperature, gamma characteristics, sharpness (emphasis) and the like;

image quality adjustment process means for
10 executing the image quality adjustment processes for plural images on the basis of each of combinations of the image quality adjustment values stored in said image quality adjustment value storage means; and

control means for executing an image quality
15 adjustment process to an input image by said image quality adjustment process means on the basis of an image quality adjustment value before performing an image quality adjustment operation stored in said image quality adjustment value storage means and
20 converting the input image into a first image which was reduced by said image enlargement and reduction means, and similarly executing an image quality adjustment process to the input image by said image quality adjustment process means on the basis of an
25 image quality adjustment value of newly performing an adjustment operation and converting the input image into a second image which was reduced by said image

enlargement and reduction means, then displaying the converted first and second images on one screen with arranged state by said multiscreen synthesis means.

4. An image displaying apparatus according to
5 any one of Claims 1 to 3, wherein

images which are displayed on one screen with arranged state by said multiscreen synthesis means are two pieces, and the image quality adjustment value before performing the image quality adjustment
10 operation stored in said image quality adjustment value storage means coincides with a value which was previously set at a time of manufacturing, and

said multiscreen synthesis means displays an image to which the image quality adjustment process
15 was executed on the basis of the value which was previously set at the time of manufacturing and an image to which the image quality adjustment process was executed on the basis of the image quality adjustment value of performing the adjustment
20 operation on one screen with arranged state.

5. An image displaying apparatus according to any one of Claims 1 to 3, wherein

images which are displayed on one screen with arranged state by said multiscreen synthesis means
25 are two pieces, and the image quality adjustment value before performing the image quality adjustment operation stored in said image quality adjustment

value storage means coincides with a value which was used just before starting the image quality adjustment operation, and

5 said multiscreen synthesis means displays an image to which the image quality adjustment process was executed on the basis of the value which was used just before starting the image quality adjustment operation and an image to which the image quality adjustment process was executed on the basis of the
10 image quality adjustment value of performing the adjustment operation on one screen with arranged state.

6. An image displaying apparatus according to any one of Claims 1 to 3, wherein

15 images which are displayed with arranged state by said multiscreen synthesis means are two pieces, and any one value can be selected from a value which was previously set at a time of manufacturing or a value which was used just before starting the image
20 quality adjustment operation as the image quality adjustment value before performing the image quality adjustment operation stored in said image quality adjustment value storage means, and

 said multiscreen synthesis means displays any
25 one image from an image to which the image quality adjustment process was executed on the basis of the value which was previously set at the time of

manufacturing or an image to which the image quality adjustment process was executed on the basis of the value which was used just before starting the image quality adjustment operation and an image to which
5 the image quality adjustment process was executed on the basis of the image quality adjustment value of performing the adjustment operation on one screen with arranged state.

7. An image displaying apparatus according to
10 any one of Claims 1 to 3, wherein

images which are displayed with arranged state by said multiscreen synthesis means are three pieces, and the image quality adjustment values before performing the image quality adjustment operation
15 stored in said image quality adjustment value storage means are two values which were previously set at a time of manufacturing and used just before starting the image quality adjustment operation, and

said multiscreen synthesis means displays three
20 pieces of an image to which the image quality adjustment process was executed on the basis of the value which was previously set at the time of manufacturing, an image to which the image quality adjustment process was executed on the basis of the
25 value which was used just before starting the image quality adjustment operation and an image to which the image quality adjustment process was executed on

the basis of the image quality adjustment value of performing the adjustment operation on one screen with arranged state.

8. An image displaying apparatus according to
5 any one of Claims 1 to 7, further comprising operation means for arbitrarily setting a reduction ratio in said image enlargement and reduction means and image arrangement or trimming position in said multiscreen synthesis means.

10 9. An image displaying method comprising:

a multiscreen synthesis step of composing one screen by executing a trimming process to a part of an input image and arranging plural pieces of that image;

15 an image quality adjustment value storage step of storing plural combinations of various image quality adjustment values such as lightness, contrast, chromaticity, hue, RGB balance, color temperature, gamma characteristics, sharpness (emphasis) and the
20 like; and

an image quality adjustment process step of executing the image quality adjustment processes for plural images on the basis of each of combinations of the image quality adjustment values stored in said
25 image quality adjustment value storage step,

wherein an input image is converted into a first image to which an image quality adjustment process

was executed in said image quality adjustment process step on the basis of an image quality adjustment value before performing an image quality adjustment operation stored in said image quality adjustment value storage step, and similarly the input image is converted into a second image to which an image quality adjustment process was executed in said image quality adjustment process step on the basis of an image quality adjustment value of newly performing an adjustment operation, then the converted first and second images are displayed on one screen with arranged state in said multiscreen synthesis step.

10. An image displaying method comprising:
 - an image enlargement and reduction step of enlarging and reducing an input image;
 - a multiscreen synthesis step of composing one screen by arranging plural pieces of the input image reduced in said image enlargement and reduction step;
 - an image quality adjustment value storage step of storing plural combinations of image quality adjustment values such as lightness, contrast, chromaticity, hue, RGB balance, color temperature, gamma characteristics, sharpness (emphasis) and the like; and
 - an image quality adjustment process step of executing the image quality adjustment processes for plural images on the basis of each of combinations of

the image quality adjustment values stored in said image quality adjustment value storage step,

wherein an image quality adjustment process is executed to an input image in said image quality adjustment process step on the basis of an image quality adjustment value before performing an image quality adjustment operation stored in said image quality adjustment value storage step and the input image is converted into a first image which was reduced in said image enlargement and reduction step, and similarly an image quality adjustment process is executed to the input image in said image quality adjustment process step on the basis of an image quality adjustment value of newly performing an adjustment operation and the input image is converted into a second image which was reduced in said image enlargement and reduction step, then the converted first and second images are displayed on one screen with arranged state in said multiscreen synthesis step.

11. An image displaying method comprising:
an image enlargement and reduction step of enlarging and reducing an input image;

a multiscreen synthesis step of composing one screen by executing a trimming process to a part of the image reduced in said image enlargement and reduction step and arranging plural pieces of that

image;

an image quality adjustment value storage step
of storing plural combinations of image quality
adjustment values such as lightness, contrast,
5 chromaticity, hue, RGB balance, color temperature,
gamma characteristics, sharpness (emphasis) and the
like; and

an image quality adjustment process step of
executing the image quality adjustment processes for
10 plural images on the basis of each of combinations of
the image quality adjustment values stored in said
image quality adjustment value storage step,

wherein an image quality adjustment process is
executed to an input image in said image quality
15 adjustment process step on the basis of an image
quality adjustment value before performing an image
quality adjustment operation stored in said image
quality adjustment value storage step and the input
image is converted into a first image which was
20 reduced in said image enlargement and reduction step,
and similarly an image quality adjustment process is
executed to the input image in said image quality
adjustment process step on the basis of an image
quality adjustment value of newly performing an
25 adjustment operation and the input image is converted
into a second image which was reduced in said image
enlargement and reduction step, then the converted

first and second images are displayed on one screen with arranged state in said multiscreen synthesis step.

12. An image displaying method according to any
5 one of Claims 9 to 11, wherein

images which are displayed on one screen with arranged state in said multiscreen synthesis step are two pieces, and the image quality adjustment value before performing the image quality adjustment
10 operation stored in said image quality adjustment value storage step coincides with a value which was previously set at a time of manufacturing, and

said multiscreen synthesis step displays an image to which the image quality adjustment process
15 was executed on the basis of the value which was previously set at the time of manufacturing and an image to which the image quality adjustment process was executed on the basis of the image quality adjustment value of performing the adjustment
20 operation on one screen with arranged state.

13. An image displaying method according to any one of Claims 9 to 11, wherein

images which are displayed on one screen with arranged state in said multiscreen synthesis step are
25 two pieces, and the image quality adjustment value before performing the image quality adjustment operation stored in said image quality adjustment

value storage step coincides with a value which was used just before starting the image quality adjustment operation, and

5 said multiscreen synthesis step displays an image to which the image quality adjustment process was executed on the basis of the value which was used just before starting the image quality adjustment operation and an image to which the image quality adjustment process was executed on the basis of the
10 image quality adjustment value of performing the adjustment operation on one screen with arranged state.

14. An image displaying method according to any one of Claims 9 to 11, wherein

15 images which are displayed with arranged state in said multiscreen synthesis step are two pieces, and any one value can be selected from a value which was previously set at a time of manufacturing or a value which was used just before starting the image
20 quality adjustment operation as the image quality adjustment value before performing the image quality adjustment operation stored in said image quality adjustment value storage step, and

 said multiscreen synthesis step displays any one
25 image from an image to which the image quality adjustment process was executed on the basis of the value which was previously set at the time of

manufacturing or an image to which the image quality adjustment process was executed on the basis of the value which was used just before starting the image quality adjustment operation and an image to which
5 the image quality adjustment process was executed on the basis of the image quality adjustment value of performing the adjustment operation on one screen with arranged state.

15. An image displaying method according to any
10 one of Claims 9 to 11, wherein

images which are displayed with arranged state in said multiscreen synthesis step are three pieces, and the image quality adjustment values before performing the image quality adjustment operation
15 stored in said image quality adjustment value storage step are two values which were previously set at a time of manufacturing and used just before starting the image quality adjustment operation, and

said multiscreen synthesis step displays three
20 pieces of an image to which the image quality adjustment process was executed on the basis of the value which was previously set at the time of manufacturing, an image to which the image quality adjustment process was executed on the basis of the
25 value which was used just before starting the image quality adjustment operation and an image to which the image quality adjustment process was executed on

the basis of the image quality adjustment value of performing the adjustment operation on one screen with arranged state.

16. An image displaying method according to any
5 one of Claims 9 to 15, further comprising an operation step of arbitrarily setting a reduction ratio in said image enlargement and reduction step and image arrangement or trimming position in said multiscreen synthesis step.

10 17. A recording medium which records an image display program for controlling an image displaying apparatus by a computer, wherein said program causes the computer to

convert an input image into a first image to
15 which an image quality adjustment process was executed on the basis of a stored image quality adjustment value before performing an image quality adjustment operation, and into a second image to which an image quality adjustment process was
20 executed on the basis of an image quality adjustment value of newly performing an adjustment operation, and

execute a trimming process to parts of the converted first and second images to display obtained
25 image pieces on one screen with arranged state.

18. A recording medium which records an image display program for controlling an image displaying

apparatus by a computer, wherein said program causes the computer to

execute an image quality adjustment process to an input image on the basis of a stored image quality adjustment value before performing an image quality adjustment operation and convert the input image into a first image which was reduced, and execute an image quality adjustment process to the input image on the basis of an image quality adjustment value of newly performing an adjustment operation and convert the input image into a second image which was reduced, and

display the converted first and second images on one screen with arranged state.

19. A recording medium which records an image display program for controlling an image displaying apparatus by a computer, wherein said program causes the computer to

execute an image quality adjustment process to an input image on the basis of a stored image quality adjustment value before performing an image quality adjustment operation and convert the input image into a first image which was reduced, and execute an image quality adjustment process to the input image on the basis of an image quality adjustment value of newly performing an adjustment operation and convert the input image into a second image which was reduced,

and

execute a trimming process to each part of the converted first and second images to display obtained image pieces on one screen with arranged state.

5

[Detailed Description of the Invention]

[0001]

[Field of the Invention]

The present invention relates to image
10 displaying apparatus and image displaying method
having an image quality adjustment function suitable
for a TV or the like, and a recording medium storing
a program to achieve the above method.

[0002]

15 [Prior Art]

Conventionally, an image processing apparatus
such as a TV set or the like has various image
quality adjustment functions related to hue,
chromaticity, contrast, lightness and the like on a
20 displayed image.

[0003]

[Problem to be Solved by the Invention]

However, in the image quality adjustment in this
kind of conventional image processing apparatus, it
25 is hard to objectively know effect, difference or the
like in the adjustment, therefore, there is a problem
that it is hard to judge whether or not the optimum

adjustment was performed.

[0004]

The present invention is made in consideration of the above-mentioned problem, and an object thereof is to provide convenience in performing image quality adjustment by simultaneously displaying a preadjustment image, a default adjustment image and an adjustment image when the image quality adjustment such as adjustment of contrast, color balance or the like is performed in an image displaying apparatus.

[0005]

[Means and Operations for Solving the Problem]

To achieve the above object, the invention as recited in Claim 1 is characterized by an image displaying apparatus comprising: multiscreen synthesis means for composing one screen by executing a trimming process to a part of an input image and arranging plural pieces of that image; image quality adjustment value storage means for storing plural combinations of image quality adjustment values such as lightness, contrast, chromaticity, hue, RGB balance, color temperature, gamma characteristics, sharpness (emphasis) and the like; image quality adjustment process means for executing the image quality adjustment processes for plural images on the basis of the image quality adjustment values of the respective combinations stored in the image quality

adjustment value storage means; and control means for
converting an input image into a first image to which
an image quality adjustment process was executed by
the image quality adjustment process means on the
5 basis of an image quality adjustment value before
performing an image quality adjustment operation
stored in the image quality adjustment value storage
means, and similarly converting the input image into
a second image to which an image quality adjustment
10 process was executed by the image quality adjustment
process means on the basis of an image quality
adjustment value of newly performing an adjustment
operation, then displaying the converted first and
second images on one screen with arranged state by
15 the multiscreen synthesis means.

[0006]

To achieve the above object, the invention as
recited in Claim 1 is characterized by an image
displaying apparatus comprising: image enlargement
20 and reduction means for enlarging and reducing an
input image; multiscreen synthesis means for
composing one screen by arranging plural pieces of
the input image reduced by the image enlargement and
reduction means; image quality adjustment value
25 storage means for storing plural combinations of
image quality adjustment values such as lightness,
contrast, chromaticity, hue, RGB balance, color

temperature, gamma characteristics, sharpness
(emphasis) and the like; image quality adjustment
process means for executing the image quality
adjustment processes for plural images on the basis
5 of the image quality adjustment values of the
respective combinations stored in the image quality
adjustment value storage means; and control means for
executing an image quality adjustment process to an
input image by the image quality adjustment process
10 means on the basis of an image quality adjustment
value before performing an image quality adjustment
operation stored in the image quality adjustment
value storage means and converting the input image
into a first image which was reduced by the image
15 enlargement and reduction means, and similarly
executing an image quality adjustment process to the
input image by the image quality adjustment process
means on the basis of an image quality adjustment
value of newly performing an adjustment operation and
20 converting the input image into a second image which
was reduced by the image enlargement and reduction
means, then displaying the converted first and second
images on one screen with arranged state by the
multiscreen synthesis means.

25 [0007]

To achieve the above object, the invention as
recited in Claim 3 is characterized by an image

displaying apparatus comprising: image enlargement
and reduction means for enlarging and reducing an
input image; multiscreen synthesis means for
composing one screen by executing a trimming process
5 to a part of the image reduced by the image
enlargement and reduction means and arranging plural
pieces of that image; image quality adjustment value
storage means for storing plural combinations of
image quality adjustment values such as lightness,
10 contrast, chromaticity, hue, RGB balance, color
temperature, gamma characteristics, sharpness
(emphasis) and the like; image quality adjustment
process means for executing the image quality
adjustment processes for plural images on the basis
15 of each of combinations of the image quality
adjustment values stored in the image quality
adjustment value storage means; and control means for
executing an image quality adjustment process to an
input image by the image quality adjustment process
20 means on the basis of an image quality adjustment
value before performing an image quality adjustment
operation stored in the image quality adjustment
value storage means and converting the input image
into a first image which was reduced by the image
25 enlargement and reduction means, and similarly
executing an image quality adjustment process to the
input image by the image quality adjustment process

means on the basis of an image quality adjustment value of newly performing an adjustment operation and converting the input image into a second image which was reduced by the image enlargement and reduction means, then displaying the converted first and second images on one screen with arranged state by the multiscreen synthesis means.

[0008]

Here, it is possible to be characterized in that images which are displayed on one screen with arranged state by the multiscreen synthesis means are two pieces, and the image quality adjustment value before performing the image quality adjustment operation stored in the image quality adjustment value storage means coincides with a value which was previously set at a time of manufacturing, and the multiscreen synthesis means displays an image to which the image quality adjustment process was executed on the basis of the value which was previously set at the time of manufacturing and an image to which the image quality adjustment process was executed on the basis of the image quality adjustment value of performing the adjustment operation on one screen with arranged state.

[0009]

Further, it is possible to be characterized in that images which are displayed on one screen with

arranged state by the multiscreen synthesis means are
two pieces, and the image quality adjustment value
before performing the image quality adjustment
operation stored in the image quality adjustment
5 value storage means coincides with a value which was
used just before starting the image quality
adjustment operation, and the multiscreen synthesis
means displays an image to which the image quality
adjustment process was executed on the basis of the
10 value which was used just before starting the image
quality adjustment operation and an image to which
the image quality adjustment process was executed on
the basis of the image quality adjustment value of
performing the adjustment operation on one screen
15 with arranged state.

[0010]

Furthermore, it is possible to be characterized
in that images which are displayed with arranged
state by the multiscreen synthesis means are two
20 pieces, and any one value can be selected from a
value which was previously set at a time of
manufacturing or a value which was used just before
starting the image quality adjustment operation as
the image quality adjustment value before performing
25 the image quality adjustment operation stored in the
image quality adjustment value storage means, and the
multiscreen synthesis means displays any one image

from an image to which the image quality adjustment process was executed on the basis of the value which was previously set at the time of manufacturing or an image to which the image quality adjustment process
5 was executed on the basis of the value which was used just before starting the image quality adjustment operation and an image to which the image quality adjustment process was executed on the basis of the image quality adjustment value of performing the
10 adjustment operation on one screen with arranged state.

[0011]

Furthermore, it is possible to be characterized in that images which are displayed with arranged
15 state by the multiscreen synthesis means are three pieces, and the image quality adjustment values before performing the image quality adjustment operation stored in the image quality adjustment value storage means are two values which were
20 previously set at a time of manufacturing and used just before starting the image quality adjustment operation, and the multiscreen synthesis means displays three pieces of an image to which the image quality adjustment process was executed on the basis
25 of the value which was previously set at the time of manufacturing, an image to which the image quality adjustment process was executed on the basis of the

value which was used just before starting the image quality adjustment operation and an image to which the image quality adjustment process was executed on the basis of the image quality adjustment value of performing the adjustment operation on one screen with arranged state.

[0012]

Furthermore, it is possible to be characterized by further comprising operation means for arbitrarily setting a reduction ratio in the image enlargement and reduction means and image arrangement or trimming position in the multiscreen synthesis means.

[0013]

To achieve the above object, the invention as recited in Claim 9 is characterized by an image displaying method comprising: a multiscreen synthesis step of composing one screen by executing a trimming process to a part of an input image and arranging plural pieces of that image; an image quality adjustment value storage step of storing plural combinations of various image quality adjustment values such as lightness, contrast, chromaticity, hue, RGB balance, color temperature, gamma characteristics, sharpness (emphasis) and the like; and an image quality adjustment process step of executing the image quality adjustment processes for plural images on the basis of each of combinations of the image

quality adjustment values stored in the image quality adjustment value storage step, wherein an input image is converted into a first image to which an image quality adjustment process was executed in the image quality adjustment process step on the basis of an
5 image quality adjustment value before performing an image quality adjustment operation stored in the image quality adjustment value storage step, and similarly the input image is converted into a second
10 image to which an image quality adjustment process was executed in the image quality adjustment process step on the basis of an image quality adjustment value of newly performing an adjustment operation, then the converted first and second images are
15 displayed on one screen with arranged state in the multiscreen synthesis step.

[0014]

To achieve the above object, the invention as recited in Claim 10 is characterized by an image
20 displaying method comprising: an image enlargement and reduction step of enlarging and reducing an input image; a multiscreen synthesis step of composing one screen by arranging plural pieces of the input image reduced in the image enlargement and reduction step;
25 an image quality adjustment value storage step of storing plural combinations of image quality adjustment values such as lightness, contrast,

chromaticity, hue, RGB balance, color temperature,
gamma characteristics, sharpness (emphasis) and the
like; and an image quality adjustment process step of
executing the image quality adjustment processes for
5 plural images on the basis of each of combinations of
the image quality adjustment values stored in the
image quality adjustment value storage step, wherein
an image quality adjustment process is executed to an
input image in the image quality adjustment process
10 step on the basis of an image quality adjustment
value before performing an image quality adjustment
operation stored in the image quality adjustment
value storage step and the input image is converted
into a first image which was reduced in the image
15 enlargement and reduction step, and similarly an
image quality adjustment process is executed to the
input image in the image quality adjustment process
step on the basis of an image quality adjustment
value of newly performing an adjustment operation and
20 the input image is converted into a second image
which was reduced in the image enlargement and
reduction step, then the converted first and second
images are displayed on one screen with arranged
state in the multiscreen synthesis step.

25 [0015]

To achieve the above object, the invention as
recited in Claim 11 is characterized by an image

displaying method comprising: an image enlargement and reduction step of enlarging and reducing an input image; a multiscreen synthesis step of composing one screen by executing a trimming process to a part of
5 the image reduced in the image enlargement and reduction step and arranging plural pieces of that image; an image quality adjustment value storage step of storing plural combinations of image quality adjustment values such as lightness, contrast,
10 chromaticity, hue, RGB balance, color temperature, gamma characteristics, sharpness (emphasis) and the like; and an image quality adjustment process step of executing the image quality adjustment processes for plural images on the basis of each of combinations of
15 the image quality adjustment values stored in the image quality adjustment value storage step, wherein an image quality adjustment process is executed to an input image in the image quality adjustment process step on the basis of an image quality adjustment
20 value before performing an image quality adjustment operation stored in the image quality adjustment value storage step and the input image is converted into a first image which was reduced in the image enlargement and reduction step, and similarly an
25 image quality adjustment process is executed to the input image in the image quality adjustment process step on the basis of an image quality adjustment

value of newly performing an adjustment operation and
the input image is converted into a second image
which was reduced in the image enlargement and
reduction step, then the converted first and second
5 images are displayed on one screen with arranged
state in the multiscreen synthesis step.

[0016]

To achieve the above object, the invention as
recited in Claim 17 is characterized by a recording
10 medium which records an image display program for
controlling an image displaying apparatus by a
computer, wherein the program causes the computer to
convert an input image into a first image to which an
image quality adjustment process was executed on the
15 basis of a stored image quality adjustment value
before performing an image quality adjustment
operation, and into a second image to which an image
quality adjustment process was executed on the basis
of an image quality adjustment value of newly
20 performing an adjustment operation, and execute a
trimming process to parts of the converted first and
second images to display obtained image pieces on one
screen with arranged state.

[0017]

25 To achieve the above object, the invention as
recited in Claim 18 is characterized by a recording
medium which records an image display program for

controlling an image displaying apparatus by a
computer, wherein the program causes the computer to
execute an image quality adjustment process to an
input image on the basis of a stored image quality
5 adjustment value before performing an image quality
adjustment operation and convert the input image into
a first image which was reduced, and execute an image
quality adjustment process to the input image on the
basis of an image quality adjustment value of newly
10 performing an adjustment operation and convert the
input image into a second image which was reduced,
and display the converted first and second images on
one screen with arranged state.

[0018]

15 To achieve the above object, the invention as
recited in Claim 19 is characterized by a recording
medium which records an image display program for
controlling an image displaying apparatus by a
computer, wherein the program causes the computer to
20 execute an image quality adjustment process to an
input image on the basis of a stored image quality
adjustment value before performing an image quality
adjustment operation and convert the input image into
a first image which was reduced, and execute an image
25 quality adjustment process to the input image on the
basis of an image quality adjustment value of newly
performing an adjustment operation and convert the

input image into a second image which was reduced,
and execute a trimming process to each part of the
converted first and second images to display obtained
image pieces on one screen with arranged state.

5 [0019]

(function)

According to the present invention, by the above
constitution, since an input image is reduced and an
image in performing the image adjustment operation is
10 to be displayed arranged with a standard image or an
image before performing an adjustment operation
treated as a reference image, an effect that
difference in the image quality can be easily
recognized and a delicate image quality adjustment
15 operation can be easily performed.

[0020]

[Embodiments]

Hereinafter, the embodiments of the present
invention will be described in detail with reference
20 to the attached drawings.

(First Embodiment)

Fig. 1 shows the structure of an image processing
apparatus in the first embodiment to which the present
invention is applied. In Fig. 1, numeral 1 denotes a
25 resolution converter acts as an image enlargement and
reduction means. Numeral 6 denotes an image input
terminal for inputting a digital video signal. Numerals

21 and 22 respectively denote first and second image data operation blocks act as an image quality adjustment process means. Numerals 31 and 32 denote nonvolatile memories such as first and second EPROM's
5 (Electrically Erasable Programmable Read-Only Memories) or the like act as an image quality adjustment value storage means.

[0021]

Numeral 4 denotes a screen synthesis block acts
10 as a multiscreen synthesis means. Numeral 5 denotes a display used for displaying images. Numerals 71 and 72 denote first and second frame memories function as buffers for temporarily storing image data. Numeral 74 denotes an OSD signal generator for generating a
15 signal of an OSD (On Screen Display) which visually displays various operation states or the like for an operator. Numeral 75 denotes an operation key block used for performing various operations by the operator. Numeral 76 denotes a CPU (Central
20 Processing Unit) which controls the entire of the image processing apparatus and takes an interface with the operator.

[0022]

The operation key 75 detects various keys
25 operations according to operations performed by the operator and notifies related key data to the CPU 76. Upon receiving the data input, the CPU 76 controls

the entire of an image display apparatus including the resolution converter 1, the first and second nonvolatile memories 31 and 32, the OSD signal generator 74 and other circuit blocks (not shown).

5 [0023]

Image data input from the image input terminal 6 is reduced to half the size of the original size in longitudinal and lateral directions by the resolution converter 1 and once stored in the frame memories 71 and 72. Subsequently, an operation process regarding an image quality adjustment is executed to the reduced image data output from the frame memories 71 and 72 on the basis of image quality adjustment values stored in the first and second nonvolatile memories 31 and 32 in the first and second image data operation blocks 21 and 22. As the image quality adjustment values, for example, various values such as lightness, contrast, chromaticity, hue, RGB (red, green and blue) balance, color temperature, gamma characteristics, sharpness (emphasis) and the like or combinations of these values correspond to the image quality adjustment value.

[0024]

The image quality adjustment value just before starting an image quality adjustment operation is stored in the first nonvolatile memory 31 and the image quality adjustment value in performing the

image quality adjustment operation by the operation key 75 is stored in the second nonvolatile memory 32 by an instruction from the CPU 76.

[0025]

5 The screen synthesis block 4 arranges the image data from the image data operation block 21 on a central position in a left half area in a display screen, the image data from the image data operation block 22 on a central position in a right half area
10 in the display screen and superimposes a signal from the OSD signal generator 74 on a central lower portion in the display screen, then the display 5 forms images to which a multiscreen synthesis process was executed.

15 [0026]

 Fig. 2 schematically illustrates the display screen of the display 5 at this time of the above state. In Fig. 2, numeral 101 denotes an image just before starting the image quality adjustment
20 operation, numeral 102 denotes an image in performing the image quality adjustment operation and numeral 111 denotes an image quality adjustment display according to the OSD signal generator 74.

[0027]

25 In this case, state of performing an adjustment operation of "lightness" to the image 102 displayed on a right side in the screen while comparing it with

the image 101 just before starting the image quality adjustment operation displayed on a left side in the screen is indicated. It should be noted that the reason for giving an adjustment of the "lightness" as
5 an example depends on a fact that the purpose of the present invention has to be illustrated more comprehensible in this description of expressing images in monochrome, and the adjustment is not limited to the lightness. For example, operations of
10 various image quality adjustments such as contrast, chromaticity, hue, RGB balance, color temperature, gamma characteristics, sharpness (emphasis) and the like can be performed.

[0028]

15 Next, a sequence (processing procedure) of the CPU 76 related to the image quality adjustment will be explained. A flow chart shown in Fig. 3 schematically shows a flow when the CPU 76 performs the image quality adjustment operation.

20 [0029]

At first, when the operator selects an image quality adjustment mode using the operation key 75, it is shifted to a multiscreen display mode as shown in Fig. 2 in a step 202.

25 [0030]

Then, a display process based on the OSD is executed in a step 203, an image quality adjustment

value update process of the second nonvolatile memory 32 is executed in accordance with an instruction from the operation key 75 in a step 204 and a checking process of an image quality adjustment mode

5 terminating instruction from the operation key 75 is executed in a step 205. If the image quality adjustment mode terminating instruction does not exist, the flow returns to the step 203 and the above processes are repeated.

10 [0031]

 In the step 205, if the image quality adjustment mode terminating instruction exists, the flow advances to a step 206, where an image quality adjustment value stored in the second nonvolatile
15 memory 32 at that time is firstly copied (mapping) to the first nonvolatile memory 31. Then, in a next step 207, the flow is returned to the display mode which is just before the multiscreen display mode shifted in the step 202 and the display according to the OSD
20 signal generator 74 is terminated to exit from a series of the image quality adjustment sequence.

[0032]

(Second Embodiment)

 Fig. 4 schematically illustrates a display
25 screen of a display 5 in the second embodiment to which the present invention is applied. In Fig. 4, the same reference numerals as those in the first

embodiment are given. It should be noted that since circuit blocks for realizing the second embodiment are the same as those in the first embodiment shown in Fig. 1, the detailed description thereof will be
5 omitted.

[0033]

In the second embodiment, a reduction ratio in a resolution converter 1 is set $2/3$, and both sides of two images are cut out by a screen synthesis block 4,
10 then a trimming process is executed to form images.

[0034]

The trimming process of cutting out both sides of the two images may be executed at the time of executing a reduction process in the resolution
15 converter 1 or writing image data to frame memories 71 and 72.

[0035]

(Third Embodiment)

Fig. 5 schematically illustrates a display
20 screen of a display 5 in the third embodiment to which the present invention is applied. In Fig. 5, the same reference numerals as those in the first embodiment are given. It should be noted that since circuit blocks for realizing the third embodiment are
25 the same as those in the first embodiment shown in Fig. 1, the detailed description thereof will be omitted.

[0036]

In the third embodiment, a reduction process in a resolution converter 1 is not executed and both sides of two images are cut out by a screen synthesis block 4, then a trimming process is executed to form images. The image quality adjustment display 111 according to the OSD signal generator 74 is superimposed and synthesized on the lowest position in the image 102 in performing the image quality adjustment operation.

[0037]

The trimming process of cutting out both sides of the two images may be executed at the time of executing a reduction process in the resolution converter 1 or writing image data to frame memories 71 and 72.

[0038]

(Fourth Embodiment)

Fig. 6 shows the structure of an image processing apparatus for realizing the fourth embodiment to which the present invention is applied. In the structure shown in Fig. 6, a third image data operation block 23 acts as an image quality adjustment process means, a third nonvolatile memory 33 acts as an image quality adjustment value storage means and a third buffer 73 for temporarily storing image data are respectively added to the circuit

structure shown in Fig. 1 in the first embodiment so
as to provide three systems in total. Since the
functions of each of the blocks are same as those
shown in Fig. 1 in the first embodiment, the detailed
5 description thereof will be omitted.

[0039]

The third nonvolatile memory 33 which is newly
added stores a default value previously set when the
image processing apparatus was shipped or forwarded.
10 In the ordinary operating state, a CPU 76 cannot
update this default value.

[0040]

In the fourth embodiment, a reduction ratio in a
resolution converter 1 is set $1/2$, and the image data
15 from a first image data operation block 21 is
arranged on a right upper position in a display
screen by a screen synthesis block 4, the image data
from a second image data operation block 22 is
arranged on a right lower position in the display
20 screen and the image data from the third image data
operation block 23 is arranged on a left upper
position in the display screen respectively, and a
signal from an OSD signal generator 74 is
superimposed on a left lower position in the display
25 screen, then a display 5 forms the image to which a
multiscreen synthesis process was executed.

[0041]

Fig. 7 schematically illustrates the display screen of the display 5 at this time of the above-mentioned state. In Fig. 7, the same reference numerals as those in the first embodiment are given.

5 In Fig. 7, numeral 100 denotes an image to which an image adjustment process was executed on the basis of the default value of the image quality adjustment value stored in the third nonvolatile memory 33.

[0042]

10 Therefore, the standard image 100 based on the image quality adjustment default value is displayed on a left upper position in the display screen and the image 101 just before starting the image quality adjustment operation is displayed on a right upper
15 position in the display screen, and an operator performs an image quality adjustment operation to the image 102 displayed on a right lower position in the screen while comparing it with the above-mentioned images.

20 [0043]

(Other Embodiments)

In the above first to fourth embodiments according to the present invention, the image data operation blocks 21, 22 and 23 were provided on the
25 following stages of the resolution converter 1. However, mutual positions between the image data operation blocks and the resolution converter 1 may

be replaced, and image data to which the image quality adjustment processes were executed by those image data operation blocks may be respectively reduced by exclusive resolution converters.

5 [0044]

Further, image data operation blocks capable of executing adjustment processes using an individual image quality adjustment value every area in a screen are provided on the following stages of a multiscreen synthesis means as an image quality adjustment process means, and the image quality adjustment process may be executed for one image which is multiscreen synthesized by a screen synthesis block.

10 [0045]

15 In the first to third embodiment according to the present invention, the image 101 just before starting the image quality adjustment operation and the image 102 in performing the image quality adjustment operation were displayed with arranged state. However, the standard image 100 of the image quality adjustment default value as explained in the fourth embodiment may be displayed instead of the image 101 just before starting the image quality adjustment operation.

20

25 [0046]

Further, a method of selecting any one image from the standard image 100 of the image quality

adjustment default value or the image 101 just before starting the image quality adjustment operation by an operator and displaying the selected one image as a reference image is also considered.

5 [0047]

In any of the above-mentioned embodiments according to the present invention, the arrangement of the reference image and the image 102 in performing the image quality adjustment operation is not limited to the arrangements as shown in Figs. 2, 4, 5 and 6, and a reduction ratio for the both images and the trimming quantity may be changed.

[0048]

In any of the above-mentioned embodiments according to the present invention, a digital video signal is used as an input image signal. However, it is needless to say that an effect of the present invention does not change in a case where the adjustment process is executed after an analog video signal is A/D (analog-to-digital) converted or an analog process is executed to the image quality adjustment process means itself.

[0049]

The present invention is applicable to a system composed of plural equipments (e.g., a host computer, an interface equipment, a reader, a printer, and the like) or to an apparatus including a single equipment

(e.g., a digital TV receiver, a video camera, a video editing apparatus, and the like).

[0050]

It is needless to say that an object of the
5 present invention can be achieved in a case where a
recording medium (storage medium) recording the
program codes of a software for realizing the
functions of the above-mentioned embodiments is
supplied to a system or an apparatus and then a
10 computer (or CPU or MPU) in the system or the
apparatus reads and executes the program codes stored
in the recording medium.

[0051]

In this case, the program codes themselves read
15 from the recording medium realize the functions of
the above-mentioned embodiments, and the recording
medium recording such the program codes constitutes
the present invention.

[0052]

20 The recording medium recording the program codes
and conversion data such as a table or the like can
be, for example, an FD (Floppy Disk), a hard disk, an
optical disk, a magnetooptical disk, a CD-ROM
(Compact Disk Read-Only Memory), a CD-R (Compact Disk
25 Recordable), a magnetic tape, a nonvolatile memory
card (IC (Integrated Circuit) card), a ROM or the
like.

[0053]

It is needless to say that the present invention also includes not only a case where the functions of the above-mentioned embodiments are realized by the execution of the program codes read by the computer, but also a case where an OS (Operating System) or the like functioning on the computer executes all the process or a part thereof according to the instructions of the program codes, thereby realizing the functions of the above-mentioned embodiments by the executed processes.

[0054]

[Effect of the Invention]

As explained above, according to the present invention, since the input image is reduced and the image in performing the image adjustment operation is to be displayed arranged with the standard image or the image before performing the adjustment operation treated as the reference image, the effect that difference in the adjustment can be easily recognized and a delicate image quality adjustment operation can be easily performed is obtained.

[Brief Description of the Drawings]

Fig. 1 is a block diagram showing the structure of an image processing apparatus in the first embodiment.

Fig. 2 is a schematic view of a displayed image in the first embodiment.

Fig. 3 is a flow chart showing a processing procedure in the first embodiment.

5 Fig. 4 is a schematic view of a displayed image in the second embodiment.

Fig. 5 is a schematic view of a displayed image in the third embodiment.

Fig. 6 is a block diagram showing the structure of an image processing apparatus in the fourth
10 embodiment.

Fig. 7 is a schematic view of a displayed image in the fourth embodiment.

15 [Description of Reference Numerals]

1 ... resolution converter acting as image enlargement and reduction means

4 ... screen synthesis block acting as multiscreen synthesis means

20 5 ... display used for displaying images

6 ... image input terminal

21 ... first image data operation block acting as image quality adjustment process means

22 ... second image data operation block acting as image quality adjustment process means

25 23 ... third image data operation block acting as image quality adjustment process means

- 31 ... first nonvolatile memory such as EEPROM or
the like acting as image quality
adjustment value storage means
- 5 32 ... second nonvolatile memory such as EEPROM or
the like acting as image quality
adjustment value storage means
- 33 ... third nonvolatile memory such as EEPROM or
the like acting as image quality
adjustment value storage means
- 10 71 ... first frame memory for temporarily storing
image data
- 72 ... second frame memory for temporarily storing
image data
- 15 73 ... third frame memory for temporarily storing
image data
- 74 ... signal generator for generating a signal of
OSD (On Screen Display)
- 75 ... operation key
- 76 ... CPU (Central Processing Unit)

[Document Title] Abstract

[Abstract]

[Problem] In an image processing apparatus having an image quality adjustment function, to provide

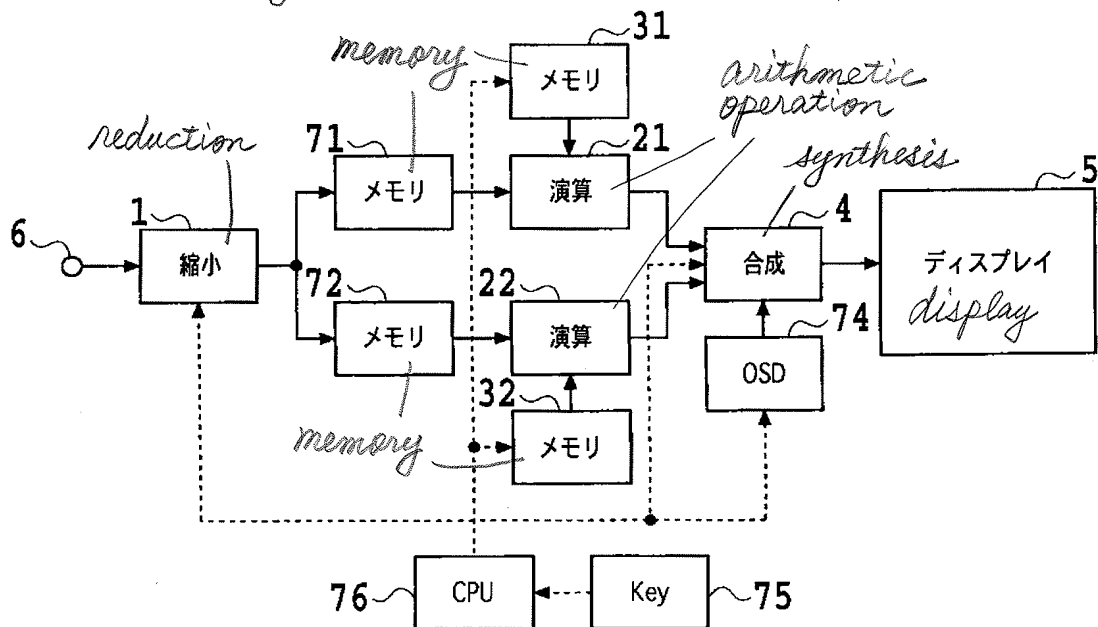
5 convenience in performing image quality adjustment by simultaneously displaying a preadjustment image, a default adjustment image and an adjustment image when image quality adjustment such as adjustment of contrast, color balance or the like is performed.

10 [Means for Achieving Object] Images of the same video source are simultaneously displayed by a multiscreen display according to a multiscreen synthesis function. Further, plural memories such as EPROM's or the like for storing an image quality adjustment value are
15 provided. Then, an image 100 in performing the image quality adjustment operation is displayed on one screen of a multiscreen, an image 101 just before starting the image quality adjustment operation is displayed on another screen of the multiscreen, and
20 an image 102 of which the image quality was previously set at the time of manufacturing is displayed as a reference image.

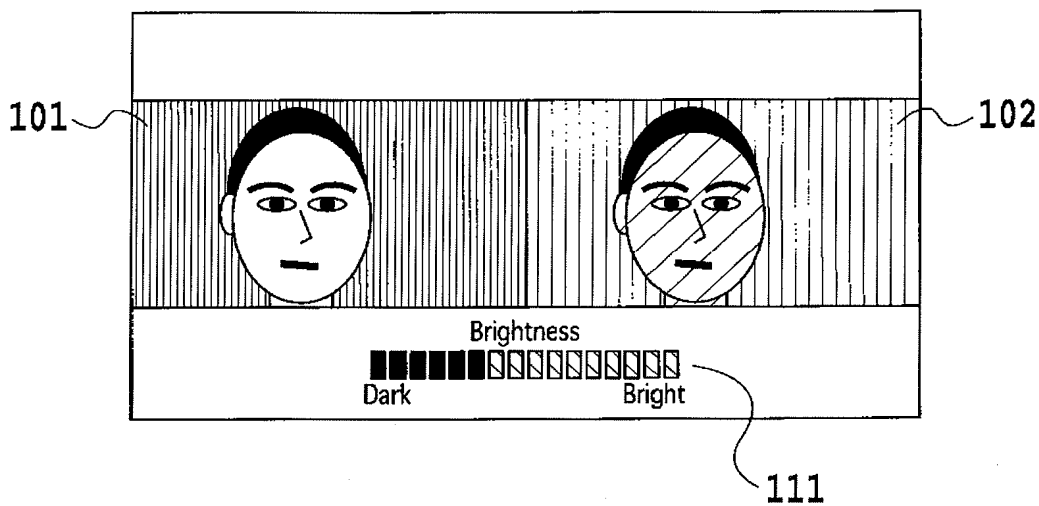
[Selective Drawing] Fig. 7

【書類名】 図面 [Document Title] Drawings

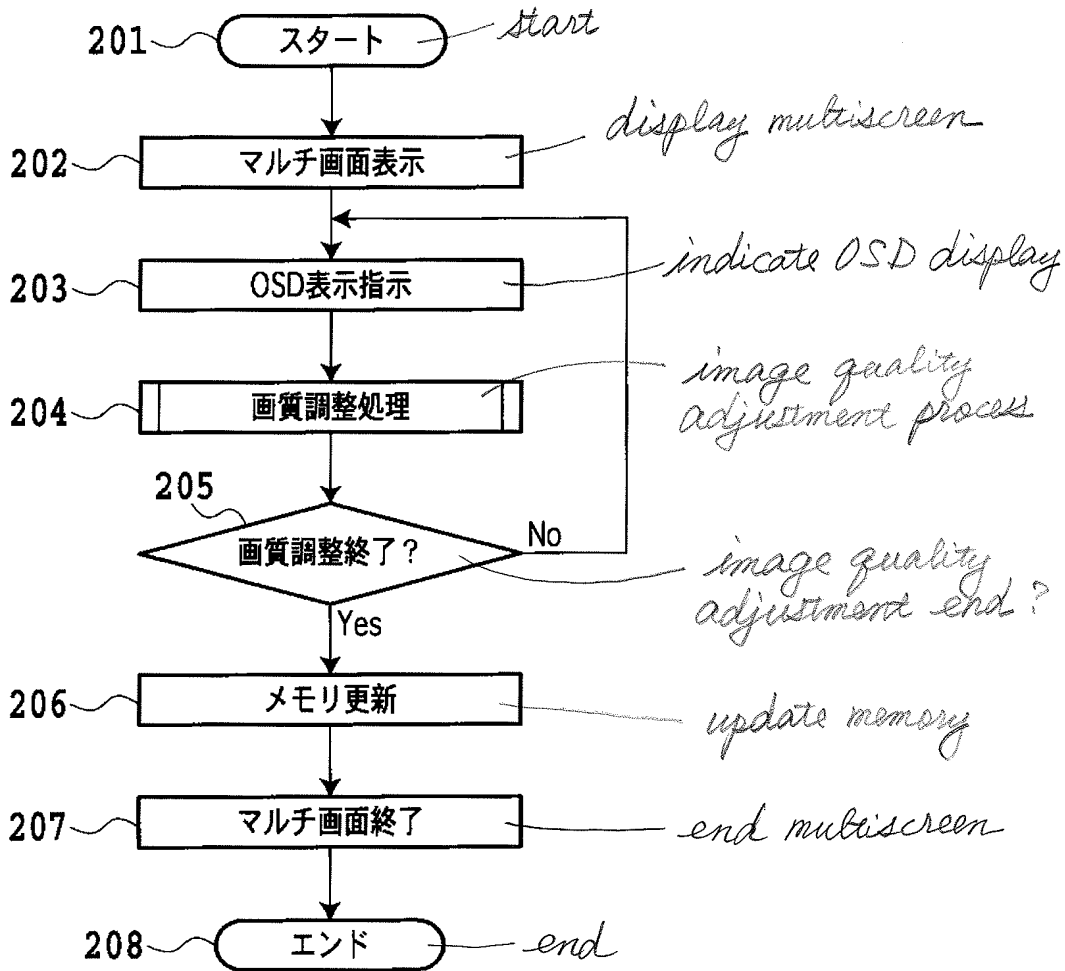
【図1】 [Fig. 1]



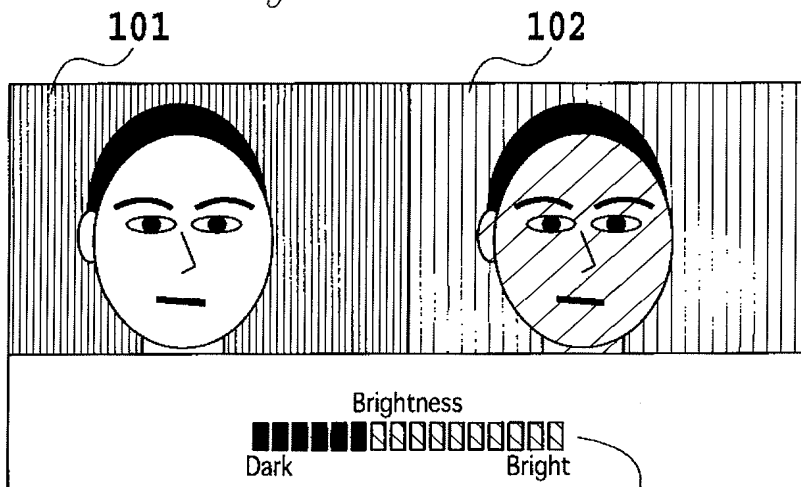
【図2】 [Fig. 2]



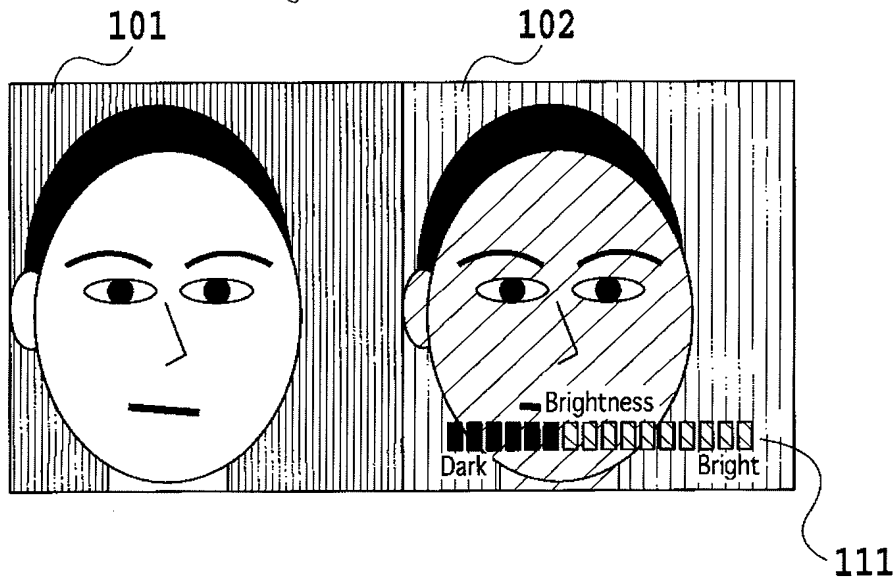
【図3】 [Fig. 3]



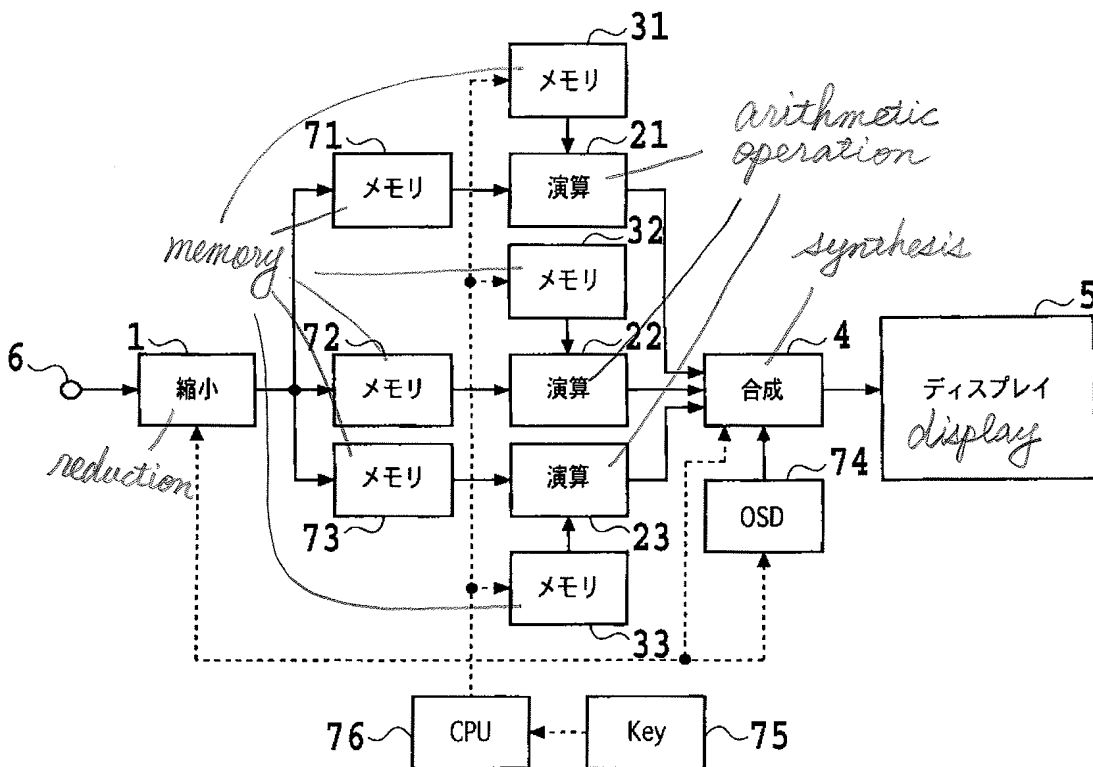
【図4】 [Fig. 4]



【図5】 [Fig. 5]



【図6】 [Fig. 6]



【図7】 [Fig. 7]

